

NEW NORTH AMERICAN *COLOBAEA*, WITH A PRELIMINARY
ANALYSIS OF RELATED GENERA (DIPTERA: SCIOMYZIDAE)

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Abstract.—Two new species of *Colobaea* (Diptera: Sciomyzidae) are described: *C. canadensis* from Manitoba, Canada, and *C. montana* from Montana, United States. The male genitalia, wings, and antennae are illustrated; the distributions, along with that of *C. americana* Steyskal, are shown in a map; and a key to the world species is included. The major characters of the genera *Colobaea*, *Pherbellia*, *Pteromicra*, and *Ditaeniella* are compared and characterized as plesiomorphic or apomorphic, as an aid in determining the generic placement of the new species. *Pherbellia trivittata* (Cresson), *P. parallela* (Walker), and *P. patagonensis* (Macquart) are reassigned to *Ditaeniella*.

Key Words: Flies, *Ditaeniella*, *Pteromicra*, *Pherbellia*, taxonomy, systematics, identification

Although the classification of the Sciomyzidae has become well established over the past three decades, new species are continually being discovered, particularly the smaller, rarer, and less conspicuous species.

The genus *Colobaea* Zetterstedt consists primarily of small, black and yellow flies and includes the smallest (less than 2 mm) species of Sciomyzidae, *Colobaea americana* Steyskal (1954). Prior to this study one species was described from the Nearctic Region and seven were described from the Palearctic Region. There is one undescribed species from Pakistan, Afghanistan, and Iran and one from Nigeria.

Species of *Colobaea* were among the first for which there was at least circumstantial

evidence (provided over 60 years ago) that the larvae of Sciomyzidae feed on mollusks. Lundbeck (1923) reared adults of *C. pectoralis* (Zetterstedt) and *C. punctata* (Lundbeck) from puparia found in floating shells of small aquatic snails in Denmark. Rozkošný (1967) provided brief descriptions of the puparia of *Colobaea distincta* (Meigen) and *C. pectoralis*, and Knutson et al. (1973) reared an undescribed species of *Colobaea* in Iran and presented the essential aspects of the life cycle (as *C. iranica* Knutson, *nomen nudum*). Knutson and Bratt (in preparation) have reared the Palearctic species *C. bifasciella* (Fallén), *C. pectoralis*, and *C. punctata*, the Nearctic species *C. americana*, and the undescribed species from Iran through their complete life cycles and will describe all of their immature stages.

Despite their apparent restriction to freshwater habitats where there are various small species of non-operculate snails, the

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Table 1. Character states of major generic features of *Colobaea* and related genera.

	<i>Colobaea</i>	<i>Pteromicra</i>	<i>Ditaeniella</i>	<i>Pherbellia</i>
1	+ (-)	-	-	-
2	+ (-)	-	-	-
3	+	- (+)	-	-
4	+ (-)	-	-	- (+)
5	+ (-)	-	-	-
6	-	+ (-)	-	-
7	-	+ (-)	-	-
8	-	+	-	-
9	-	+ (-)	+	-
10	-	-	+ (-)	-
11	-	-	+	- (+)
12	-	-	+	-
13	-	-	+	-

List of characters (+ = apomorphic state, - = plesiomorphic state; exceptions noted in parentheses):

1. Arista with some dorsobasal hairs slightly to much longer than ventrobasal hairs (same length in *C. canadensis*).

2. Vein Sc ending close to anterior branch of R₁ (except in *C. canadensis*).

3. Vein A₁ + CuA₂ evanescent apically (variable in *Pteromicra leucothrix* Melander).

4. Anterior surstylus with characteristic peglike processes [absent in *C. canadensis*; present in *Pherbellia mikiana* (Hendel)].

5. Hypandrium with narrow, long posterior process (except in *C. bifasciella*).

6. Frons entirely shining (tomentose in an undescribed species of *Pteromicra* from Japan and India).

7. Fore femur with pecten (absent in *Pteromicra anopla* Steyskal).

8. Hypandrium with pair of pubescent lobes in posteroventral position.

9. Only one fronto-orbital seta [two pairs in *Pteromicra angustipennis* (Staeger) and *P. leucopeza* (Meigen)].

10. Prosternum haired (hairs absent in *D. trivittata*).

11. Inner posterior margin of hind coxa with several hairs (present in *Pherbellia seticoxa* Steyskal).

12. Anterior surstylus considerably reduced.

13. Paramere with conspicuous apical spines.

species of *Colobaea* are broadly distributed. *Colobaea* is most abundant and species rich in Europe and species are also known from Central Asia, Pakistan, Iran, and northern Nigeria. In North America, *Colobaea* ranges from Montana to Manitoba, Quebec, and New York. In his recent review, Rozkošný (1984a) characterized the genus, described a new species from Sweden and Finland, and presented a key to the species. Roz-

košný (1984b) illustrated the terminalia of all the species known from Fennoscandia and Denmark. The male genitalia of *C. punctata* were illustrated by Rivosecchi and Prigioni (1980).

To date, the only described Nearctic representative of *Colobaea* is *C. americana* Steyskal. The two North American species described below also apparently belong to *Colobaea*; *C. montana* Knutson and Orth has all of the recognized apomorphic characteristics of the genus, but the placement of *C. canadensis* Knutson and Orth is less certain. Table 1 shows the character states of the major generic features (primarily as recognized by Rozkošný 1984b) of *Colobaea* and the three related genera, *Pherbellia* Robineau-Desvoidy, *Pteromicra* Lioy, and the recently resurrected *Ditaeniella* Sack (Rozkošný 1987); however, we have not been able to identify any synapomorphies for these four genera.

KEY TO SPECIES OF *COLOBAEA* ZETTERSTEDT (MODIFIED FROM ROZKOŠNÝ 1984a)

1. Ground color of mesonotum brownish yellow; wing with two transverse dark bands (Palearctic) *C. bifasciella* (Fallén)
- Mesonotum black; wing without bands 2
2. Proepisternum and anepisternum both, at least in part, yellow 3
- Proepisternum and anepisternum usually entirely black like rest of thorax 7
3. Thorax mainly black, but with some yellow on proepisternum and anepisternum 4
- Thorax more extensively yellow 5
4. Dorsobasal hairs of arista distinctly longer than ventrobasal hairs (Nearctic) *C. americana* Steyskal
- Dorsobasal hairs of arista not longer than ventrobasal hairs (Nearctic) *C. canadensis* Knutson and Orth, n. sp.
5. Third antennal segment 3 times as long as width at base; both crossveins of wing conspicuously infumated (Palearctic) ... *C. limbata* (Hendel)
- Third antennal segment 2 times as long as width at base; crossveins not infumated 6
6. Upper margin of anepisternum with complete dark stripe (Palearctic) *C. pectoralis* (Zetterstedt)
- Upper margin of anepisternum only with rounded black spot below anterior notopleural seta (Palearctic) *C. punctata* (Lundbeck)

- 7. Third antennal segment 3 times as long as wide basally; both crossveins of wing distinctly infumated (Palearctic) *C. beckeri* (Hendel)
- Third antennal segment 2 times as long as wide basally; crossveins not infumated 8
- 8. Third antennal segment and arista black; anterior margin of frons extensively yellow 9
- Third antennal segment white at base, arista white; frons entirely black (Palearctic)
- *C. distincta* (Meigen)
- 9. Propleuron always black; only last tarsal segment of foreleg white (Palearctic)
- *C. nigroaristata* Rozkošný
- Propleuron usually black, occasionally yellowish; last two tarsal segments of foreleg white (Nearctic) *C. montana* Knutson and Orth n. sp.

***Colobaea canadensis* Knutson and Orth,
NEW SPECIES
Figs. 1–4, 13**

Male.—Body length, 3.0 mm. Head slightly wider than high, width of gena about ¼ height of eye. Face and gena with short, whitish tomentum. Frons narrowed anteriorly, yellowish tomentose, with many short, black bristles evenly distributed over anterior ¼. Ocellar triangle shiny black, not extending as far as anterior end of shiny, brownish fronto-orbital plates. No orbito-antennal spot, very narrow stripe of fine, whitish tomentum extending along upper orbital margin and fading out near posterior fronto-orbital bristle. Pair of shallow depressions, with dense whitish tomentum, on either side of midline near top of occiput. Occiput blackish brown around foramen. Postgena yellowish to tan. Two pairs of rather strongly recurved fronto-orbital bristles, anterior pair slightly shorter than posterior pair; ocellar, postocellar, and inner and outer vertical bristles well developed and subequal in length. Many short, black setae on lower ½ of gena, finer anteriorly and extending onto lower parafacial. Short black setae also on ocellar triangle, along outer margin of fronto-orbital plates, and above occipital foramen. Lateral margins of occiput and postgena with several rows of irregularly dispersed, short, stout setae, no such setae mid-dorsally on occiput. Antennae light yellow to yellowish brown; seg-

ment 3 oval, darkened dorso-apically. Arista brown, lighter basally, plumosity moderately dense, semi-recumbent, about as long as width of arista at base, dorsobasal hairs not setose or longer than ventrobasal hairs. Palpus yellowish white with many strong bristles, especially apically; labella yellowish.

Thorax black with faint gray tomentum, postpronotal lobe slightly brownish. Pleura mostly brownish black, lower parts with strong whitish tomentum; ventral part of propleuron and anteroventral part of anepisternum yellowish. Thoracic chaetotaxy: 1 pro-episternal, 1 postpronotal, 1 presutural intra-alar bristle, 2 notopleural, 1 supra-alar, 2 subequal postalar, 2 dorsocentral (anterior pair slightly shorter, somewhat mesad of posterior pair and caudad of supra-alar), 1 weak prescutellar acrostichal behind dorsocentral, 1 basal scutellar, and 1 subequal apical scutellar. A few fine hairs posterior to pro-episternal seta. Anepisternum bare. Anepimeron with two fine bristles anteroventrally, no vallar (subalar) bristles. Posterior half of katepisternum with dense coat of long, fine hairs over most of surface, several bristles along upper margin, two exceptionally long hairs posterodorsally, well developed bristles ventrally. Pro-episternum bare.

Front coxa slightly less than ¾ length of fore femur, yellow with whitish tomentum, several strong bristles below middle on external margin and one or two near apex; midcoxa brownish dorsolaterally, yellowish ventrally; hind coxa yellowish, bare on posterodorsal surface. Fore femur robust, shiny black, with two irregular rows of 6–10 bristles on dorsal surface, bristles of anterior row larger than those of posterior row; mid-femur with anterior bristle beyond middle and three short hairlike bristles in row at posteroventral apex. Hind femur with two strong bristles posterodorsally, ventrally with dense coat of short bristles; fore tibia black except extreme base yellowish, with dense coat of greyish tomentum; mid and hind tibiae yellowish. Tarsi entirely yellow

except basal segment of fore tarsus darker on sides.

Wing length, 2.8 mm. Membrane yellowish, hyaline; longitudinal veins yellow, crossveins darker and slightly infuscated. Pterostigma large, R_1 terminating beyond r-m crossvein, r-m crossvein at midlength of discal medial (dm) cell, vein $A_1 + CuA_2$ not reaching margin of wing. A few short setae on R_{4+5} beyond r-m crossvein and on CuA_1 before dm-cu crossvein. Halter, calypter, and calyptal ciliae yellowish white.

Abdominal terga shiny dark brown with faint silvery tomentum, posterior margins yellowish. Bristles longest on posterolateral margins of fifth tergum. Syntergosternite 6-8 well developed, anterior margin of sixth sternum darkly pigmented, extending across venter to dextral side of abdomen. Terminalia shiny blackish brown. Andrium as in Figs. 1 and 2. Ventral margin of epandrium not oblique posteriorly. Anterior surstylus flat, with one rounded, posterolaterally directed lobe and one rounded, ventrally directed lobe; without darkly pigmented, mesal peglike processes. Posterior surstylus broad, scooplike, apex curved at almost right angle to meson; apices of posterior surstyli overlapping. Anterior end of hypandrium straight, broad. Ejaculatory apodeme equal in length to aedeagal apodeme, sinuate, plate rather small. Posterior arms of aedeagal apodeme broad, moderately elongate.

Female.—Body length, 3.0-3.2 mm. Frons only slightly narrowed anteriorly. Subshiny orbital plates light brown, only slightly darker than yellowish frons. Occiput brownish, cervical area yellowish. No strong hairs at base of arista.

Postpronotal lobe yellow. Pro-episternum extensively yellow below spiracle, anepisternum faintly yellow along upper part of posterior margin; anepimeron mottled yellow and brown. Prescutellar acrostichal bristles not larger than other acrostichals. Outer postalar a little larger than inner postalar. Anepimeron with three or four fine bristles. Katepisternal hairs and bristles shorter, sparser than in male.

Abdominal terga lighter than in male, posterior margins narrowly to broadly yellow. Cercus yellow.

Midcoxa brownish to yellowish laterally. One specimen with three posterodorsal and two anterodorsal bristles apically on hind femur. Fore tarsus black to dark brown, apical segment lighter; mid and hind tarsi yellow.

Wing length, 2.9-3.1 mm.

Diagnosis: *Colobaea canadensis* differs from all other species of *Colobaea* by the dorsobasal hairs on the arista being no longer than the ventrobasal hairs, and the lack of peglike processes on the anterior surstylus. It most resembles *C. bifasciella* in that both species have a dull, tomentose, bristled, yellow frons; a similarly shaped head; two pairs of postalar bristles; and R_1 extending to the level of the r-m crossvein. These two species can be readily distinguished, however; *C. canadensis* has a mainly shiny black body and unpatterned wings, whereas *C. bifasciella* has a yellow body with black markings and patterned wings.

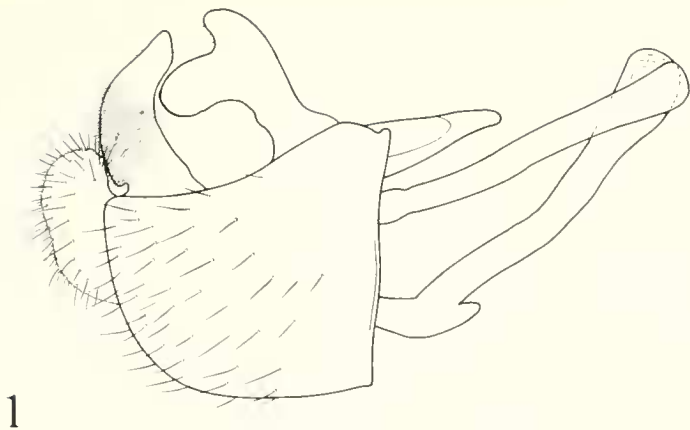
Type specimens.—Holotype male: Canada, Manitoba, Mile 505, Hudson Bay Ry.; 13 June 1952; J. G. Chillcott; ecological data F-D; in Canadian National Collection, Ottawa. Allotype: female, Canada, Manitoba, Mile 504, Hudson Bay Ry.; 21 June 1952; J. G. Chillcott; ecological data F-H, along RR; in Canadian National Collection. Paratype: female, Canada, Manitoba, Warkwork Cr. nr. Churchill; 7 July 1952; J. G. Chillcott, ecological data F-D; LVK Slide Nos. 7044 and 7055, in United States National Museum of Natural History. Distribution map, Fig. 13.

Colobaea montana Knutson and Orth,

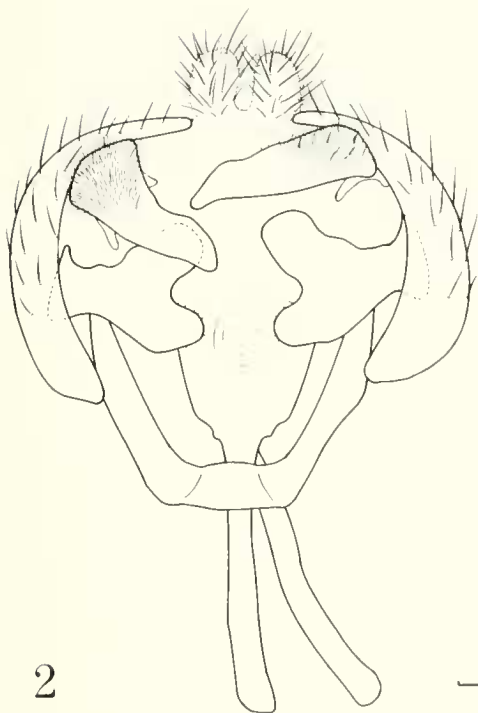
NEW SPECIES

Figs. 5-13

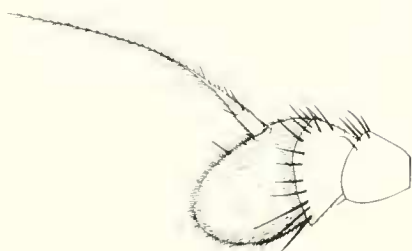
Male (female unknown): Body length, 3.0 mm. Head $\frac{1}{4}$ narrower than height; height of gena about $\frac{1}{5}$ height of eye. Face shiny yellow, narrow, with strong median carina; clypeus rounded and somewhat produced



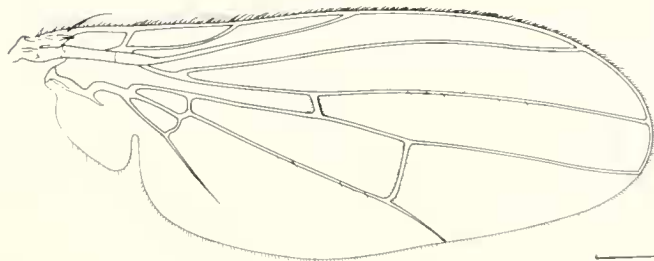
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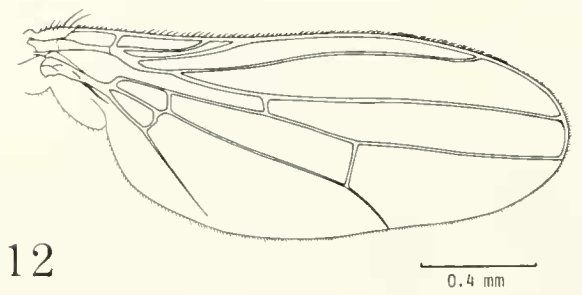
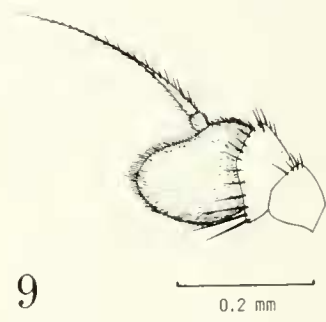
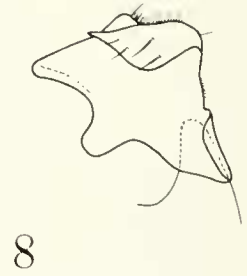
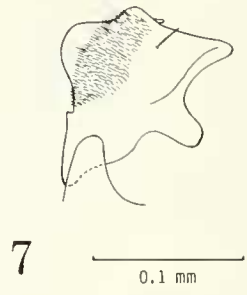
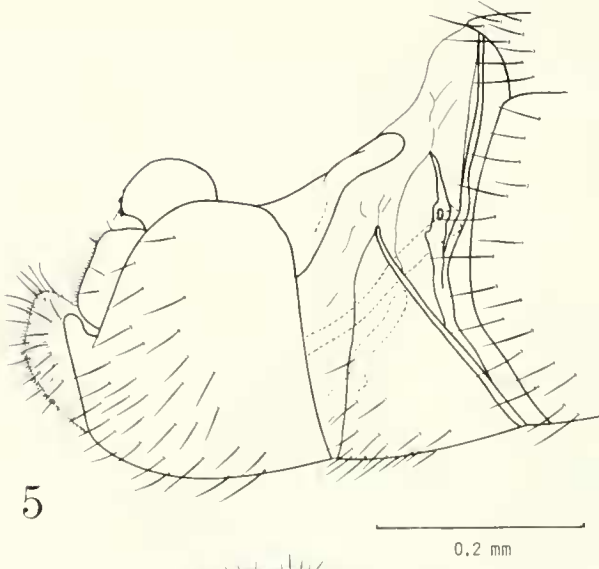
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0.4 mm

Figs. 1, 2. *Colobaea canadensis*, holotype male. 1, Postabdomen, sinistral view, inverted. 2, Postabdomen, ventral view.

Figs. 3, 4. *Colobaea canadensis*, paratype female. 3, Left antenna. 4, Right wing.



anteriorly. Gena yellowish white. Frons strongly narrowed just above antenna, densely matt-tomentose, mostly black, yellowish anteriorly, yellow area extended triangularly toward anterior ocellus. Ocellar triangle subshiny black, not prolonged anteriorly; fronto-orbital plates shiny black; tomentose whitish patch between base of antenna and orbital plate. Occiput shiny black over most of surface; postgena whitish yellow. Two subequal, erect fronto-orbital bristles; ocellars and inner and outer verticals well developed, longer than fronto-orbitals; postocellars smaller than fronto-orbitals. Short, black setae in two irregular rows along lower margin of gena extending along groove between gena and face to anteroventral angle of eye; on anterolateral edge of yellowish part of frons; sparsely between ocellar and postocellar bristles; and in patch above foramen. Upper occipital margin with weak setae only. First and second antennal segments yellow; second segment with weak bristles on dorsal edge, around apical margin, and several strong bristles ventro-apically; third segment ovoid, black, slightly brownish at base of arista on external surface, more extensively yellowish brown basally on inner surface. Arista brown with a few short, rather thick hairs; some dorsobasal hairs slightly spinose and longer than ventrobasal hairs; all hairs shorter than width of arista at base. Palpus yellowish white, with a few weak bristles; labella yellowish white.

Thorax including scutellum entirely black except in the Swan Lake specimen, propleuron yellowish; no silvery tomentum. Prosternum yellow. Thoracic chaetotaxy: 1 short pro-episternal, 1 postpronotal, 1 post-

humeral, 2 notopleural, 1 supra-alar, 1 post-alar, 2 dorsocentral (anterior pair slightly shorter), 1 weak prescutellar acrostichal, 1 basal scutellar, 1 apical scutellar. Anepisternum bare, anepimeron with three or four fine bristles anteriorly, no vellar bristles. Katepisternum with one strong bristle mid-dorsally and a few hairs posteroventrally, well developed bristles midventrally. Prosternum bare.

Fore coxa $\frac{2}{3}$ length of fore femur, subshiny yellowish white, one or two strong bristles below middle on external margin and several apically; mid and hind coxae yellowish, darker dorsally; hind coxa bare above. Fore femur robust, basal $\frac{1}{2}$ to $\frac{2}{3}$ yellowish, remainder black, more extensively darkened along dorsal surface, two irregular rows of 5–8 bristles on dorsal surface; mid-femur yellow, one anterior bristle beyond middle, three hairlike bristles in row at posteroventral apex; hind femur mostly yellowish, brownish apically, one strong bristle anterodorsally; ventrally with double row of widely spaced bristles. Fore tibia black, mid and hind tibiae yellow. Fore tarsus with basal segment black, segments 2 and 3 brownish, segments 4 and 5 yellowish; mid and hind tarsi yellowish, apical segment darker.

Wing length, 1.9–2.1 mm. Membrane grayish hyaline, longitudinal veins yellowish to brownish, crossveins not infuscated. Pterostigma small, Sc ending close to R_1 ; R_1 terminating basad of crossvein r-m; r-m slightly beyond midlength of cell dm; $A_1 + CuA_2$ extending almost to margin of wing. Halter, calypter, and calyptal ciliae yellowish white.

Abdominal terga and sterna shiny black, posterior margins of posterior sterna nar-

Figs. 5, 6. *Colobaea montana*, holotype male. 5. Postabdomen, sinistral view, inverted. 6. Postabdomen, ventral view.

Figs. 7–12. *Colobaea montana*, paratype male, 4 miles east of Bigfork, Montana. 7, 8. Posterior surstylus, sinistral view, inverted. 7. Outer surface. 8. Inner surface. 9. Left antenna. 10, 11. Anterior surstylus, sinistral view, inverted. 10. Outer surface. 11. Inner surface. 12. Right wing.

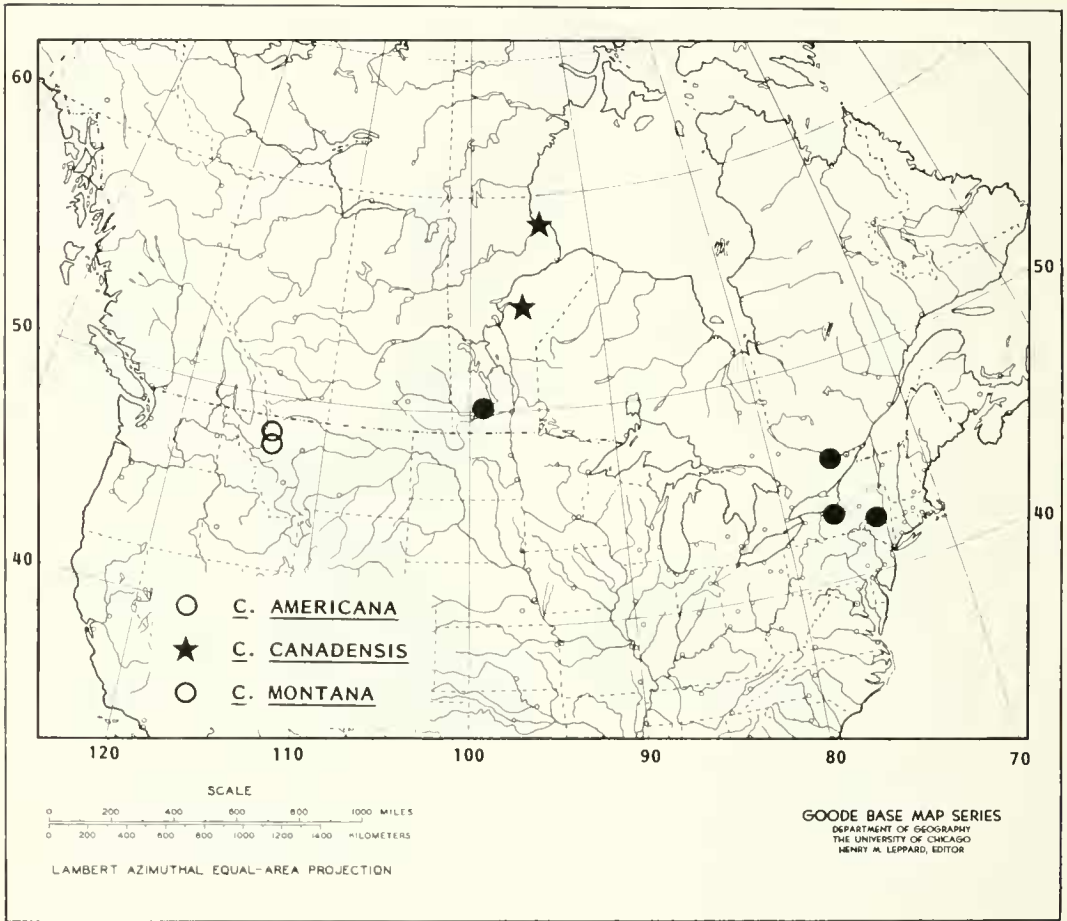


Fig. 13. Collection sites for *Colobaea americana*, *C. canadensis*, and *C. montana*.

rowly yellow; only posterior terga with a few strong, black bristles. Syntergosternite 6–8 well developed; anterior margin of sixth sternum darkly pigmented, extending across venter to dextral side of abdomen. Andrium as in Figs. 5 and 6. Epandrium with ventral margin oblique posteriorly, with lobelike process midlaterally on posterior margin. Anterior and posterior surstyli widely separated. Anterior surstylus clublike, curved mesally and approximate, posteromesal margin and posterodorsal surface with dense coat of short, thick, peglike processes. Posterior surstylus as in Figs. 7 and 8. Anterior end of hypandrium broad, rounded. Ae-

deagal apodeme lightly pigmented, broadened posteriorly, twice as long as ejaculatory apodeme.

Diagnosis: With a mostly matt black frons and R_1 terminating considerably basad of r-m, *C. montana* is more similar to *C. americana*, *C. nigroaristata* Rozkošný, *C. punctata*, and related species than it is to *C. bifasciella* and *C. canadensis*. Although in the key to species, which is based on external characters, *C. montana* and *C. nigroaristata* run out in the same couplet, males can be readily separated by the internal structures of their terminalia—most notably the shape of the posterior surstylus (see

Rozkošný 1984a). The shape of the posterior surstylus, short dorsobasal hairs on the arista, and lack of silvery tomentum along the margin of the eye distinguish *C. montana* from *C. americana*, the only other species of *Colobaea* likely to occur with *C. montana*.

Type specimens.—Holotype male and 2 male paratypes: United States, Montana, 4 miles east of Bigfork; 29 July 1965; B. A. Foote; one male paratype: Montana, 20 mi. south of Swan Lake, 20 August 1968; B. A. Foote. All specimens in the United States National Museum of Natural History. Distribution map, Fig. 13.

COMPARISON OF *COLOBAEA* WITH OTHER GENERA

A comparison of the character states of major generic features of *Colobaea* and the related genera *Pteromicra*, *Ditaeniella*, and *Pherbellia* is shown in Table 1. *Pherbellia* is probably polyphyletic. In the process of making these comparisons, it became clear that one group of "*Pherbellia*" species should be transferred to the genus *Ditaeniella*. *Ditaeniella* was proposed by Sack (1939) for the Palaearctic species *Sciomyza grisescens* Meigen. Most subsequent authors placed *S. grisescens* in *Sciomyza* or *Pherbellia*. Steyskal (1963) noted the similarities (especially in the male genitalia) of *S. grisescens*, *S. humilis* Loew (Nearctic) (= *S. parallela* Walker), and *S. patagonensis* Macquart (Neotropical) and placed these species in the *Pherbellia grisescens* group. He noted, "The andrium is of a rather special type in the Sciomyzinae and may be the basis for eventually segregating the group nomenclaturally from *Pherbellia*." Rozkošný (1987) resurrected *Ditaeniella* as a valid genus, including *S. grisescens*. We propose the following new combinations:

Ditaeniella parallela (Walker) 1853 (Nearctic and Neotropical).

Ditaeniella patagonensis (Macquart) 1851 (Neotropical).

Ditaeniella trivittata (Cresson) 1920 (Nearctic).

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